ABSTRACT OF THE DISCLOSURE

[0048] The luminance of a system that includes a light emitting diode (LED), such as a projection system, may be increased by using an LED chip that has a light emitting surface that emits light directly into any medium with a refractive index of less than or equal to approximately 1.25. For example, the LED chip may emit light directly into the ambient environment, such as air or gas, instead of into an encapsulant. The low refractive index decreases the étendue of the LED, which increases luminance. Moreover, without an encapsulant, a collimating optical element, such as a lens, can be positioned close to the light emitting surface of the LED chip, which advantageously permits the capture of light emitted at large angles. A secondary collimating optical element may be used to assist in focusing the light on a target, such as a micro-display.